REMARKS

Claims 29, 40, and 51 are currently being amended. Additionally, Applicant has amended the specification to obviate the current objection thereto. A substitute specification under 37 C.F.R. 1.125(c) is provided herein. As required, a marked-up and clean copy of the specification is submitted herewith as ATTACHMENTS B and C, respectively

The current amendments do not introduce new matter within the meaning of 35 U.S.C. §132. Accordingly, the Examiner is respectfully requested to enter the amendments, and allowance of the claims is earnestly solicited.

1. Objection to Specification

The Office Action states,

> The disclosure stands objected to as informal due to the absence of a brief description of the drawings in accordance with 37 CFR 1.74. Appropriate correction is required.
>
> Applicants' arguments filed October 1, 2007 have been fully considered but they are not persuasive. The portion of the Specification cited by applicants as describing Figs. 1 and 2 (page 10, ll. 16-19 and page 11, ll. 22-24) is in fact part of the detailed description of the drawings. The Rules, however, require both a brief description of the several views of the drawing as well as a detailed description thereof (see, Rule 74 and 77(b)(8)-(9)). Applicants have pointed to no section of the Specification wherein a brief description of said figures is provided in accord with Rule 74, and examiner has independently found none.

RESPONSE

Applicant has amended the specification to obviate the instant objection. Accordingly, Applicant respectfully requests the objection to be withdrawn.

2. Rejection of Claims 29-61 Under 35 U.S.C. §103(a)

The Office Action states,

> Claims 29-61 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0825204 taken in view of WO 02/41986 alone or together with the evidence provided by Brown, et al.
>
> EP '204 discloses a continuous process for polymerizing olefins in a fluidized bed reactor, wherein a gaseous stream withdrawn from the reactor is recycled by cooling and separating condensed liquid from the resultant gas-liquid stream in a separator integral with the reactor and located under the fluidization grid (i.e., distributor plate), as in the applicants' process. See paragraphs 0013 and 0080 and Figs. 1-2 of EP '204. Per paragraph 0026, it is preferred that substantially the whole of the recycled gaseous stream is cooled and separated and substantially the whole of the separated liquid is introduced into the fluidized bed. Regarding claims 29 and 51, note that separation of the condensed liquid may be via coalescence of liquid droplets on a baffle situated near the point of entry of the stream to the separator, or by arranging the stream inlet tangentially to the walls of the separator so that the separator acts as a cyclone (see paragraph 0035). Given the integral arrangement of separator and reactor and location of the former under the fluidization grid, a tangential arrangement of the inlet stream to the separator walls, as disclosed, would result in the gas-liquid stream being reintroduced in the manner claimed; i.e., in a direction tangential to at least one reactor wall as per claim 29.
>
> Thus, as to claims 29-39 and 51-61, EP '204 lacks only a teaching of the claimed step of feeding at least a portion of the separated, condensed liquid above the fluidized bed through an external pipe connecting a bottom of the fluidized bed reactor to a position above the upper limit

of the fluidized bed.

In this regard, however, WO '986 discloses a fluidized bed reactor characterized by one or more external pipes connecting the lower part of the reaction chamber to a top part thereof and/or the outlet section, situated above the reaction chamber; see page 3, line 19-22 and Fig. 1/1. By affording a greater supply of liquid to the reactor (relative to supplied amount of gas), the presence of the connecting pipe(s) is taught to result in higher production rates than in known reactors of equal dimensions (page 3, ll. 23-27). Condensed mode operation of the disclosed reactor in a continuous process for polymerizing olefins is detailed on pages 7-9. Recycling a gas-liquid mixture to the reactor is detailed at page 8, lines 30+.

Thus, WO '986 teaches, as alternative embodiments, terminating the external pipe in the wall of the reaction chamber or the outlet section of the reactor (pp. 4-5, bridging paragraph), for the purpose of transporting condensed liquid to the upper portion of a fluidized bed reactor in order to enhance production rate.

Since EP '204 is similarly concerned with achieving higher levels of productivity via enhanced cooling effect (cf., e.g., paragraph 0053), it would have been obvious to an ordinary skilled practioner at the time of applicants' invention to modify the process disclosed therein by feeding the condensed, separated liquid through an external pipe(s) as per WO '986 to a position above the upper limit of the fluidized bed, as claimed. The expectation of thereby providing an alternative continuous polymerization process with comparable improvements in production rate would have provided the requisite motivation to those of ordinary skill in the art to modify the primary reference so as to produce the instantly claimed invention.

Regarding claims 40-50, EP '204 differs from the claimed subject matter in failing to explicitly teach that the condensed liquid is separated from the gas by a centrifugal effect and fed above the fluidized bed through an external pipe connecting a bottom of the fluidized bed reactor to a position above the upper limit of the fluidized bed.

However, as noted above, EP '204 does provide (paragraph 0035) for use of an integral separator that may act as a cyclone. Further, as evidenced by Brown et al, the prior art has recognized both cyclone and centrifugal separators as suitable means for separating liquid from a cooled gas-

liquid recycle stream to a fluidized bed reactor for polymerizing olefins (see Brown at col. 7, ll. 21+). It would have been obvious to one of ordinary skill in the art to replace the cyclone in EP '204 with a centrifugal separator because the mere substitution of an equivalent (something equal in value of meaning, as taught by analogous prior art) is not an act of invention; where equivalency is known in the prior art, the substitution of one equivalent for another is not patentable (i.e., it would have been obvious). In re Ruff, 118 USPQ 343 (CCPA 1958). To then feed the separated liquid through an external pipe to a position above the upper limit of the fluidized bed, as claimed, would have been obvious to one of ordinary skill from WO '986 as discussed above, or from the teaching of Brown et al that the separated liquid may be transferred through an external line to a region of the reactor above the fluidized bed; e.g., the expanded section as shown in Fig. 3 thereof.

RESPONSE

Applicant respectfully traverses the rejection of claims 29-61.

The U.S. Supreme Court in *Graham v. John Deere Co.*, 148 U.S.P.Q. 459 (1966) held that non-obviousness was determined under §103 by (1) determining the scope and content of the prior art; (2) ascertaining the differences between the prior art and the claims at issue; (3) resolving the level of ordinary skill in the art; and, (4) inquiring as to any objective evidence of non-obviousness.

Accordingly, for the Examiner to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation

of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. See MPEP §2142.

With respect to the instant rejection, the current Office Action acknowledges on page 3, line 21 - page 4, line 2 that EP 0 825 204 (herein referred to as "Chinh, et al.") does not teach,

> . . . feeding at least a portion of the separated, condensed liquid above the fluidized bed through an external pipe connecting a bottom of the fluidized bed reactor to a position above the upper limit of the fluidized bed.

As such, the Examiner then tries to remedy this factual deficiency in Chinh, et al. by stating on page 4, lines 3-6,

> In this regard, however, WO '986 discloses a fluidized bed reactor characterized by one or more external pipes connecting the lower part of the reaction chamber to a top part thereof and/or the outlet section, situated above the reaction chamber; see page 3, line 19-22 and Fig. 1/1.

However, Applicant respectfully traverses the Examiner's conclusion. First and foremost, Applicant's specification states on page 5, line 25 - page 6, line 19, and page 8, line 12 - page 9, line 1,

> According to **EP 825 204**, the gas/liquid mixture obtained by cooling the recycle stream is transferred to the bottom of a fluidized bed reactor, where the condensed liquid is separated from the gaseous stream in a separator which is integral with the fluidized bed reactor. The liquid is withdrawn from the bottom of said integral separator and is introduced into the lower part of the fluidized bed. Also this process requires the **use of injection means**, preferably nozzles, arranged so as to **protrude** substantially vertically **into the fluidized bed** or to protrude from the walls of the reactor in a

substantially horizontal direction. The presence of said injection means **can cause undesirable turbulence** and **serious risk of fouling** due to the creation of dead spots in the vicinity of the nozzles or other injection means. Furthermore, also this process **requires the presence of a pump**, downstream the integral separator, for introducing the condensed liquid inside the fluidized bed and for maintaining a continuous circulation and stirring of liquid at the bottom of the integral separator.

It would be desirable to improve the process described in EP 825 204 by **avoiding** the use of **liquid injection means directly protruding into the fluidized bed of polymer particles** and, at the same time, simplifying the equipments involved in the recycle line. It has now been found that a particular arrangement in the recycle line of the gas/liquid mixture **allows to obtain a more effective cooling of a fluidized bed reactor with the advantages of reducing the complexity of the plant setup and avoiding the use of injection means directly protruding into the fluidized bed.**

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Many advantages can be accomplished by carrying out the process of the invention. In the first place, the introduction of condensed liquid above the fluidized bed **improves the cooling of the upper region of the fluidized bed without causing any turbulence and interference with the fluidization conditions of the polymer bed.** Simultaneously, the remaining part of condensed liquid moves upwards through the distribution plate so as to effect a good cooling of the lower region of the bed. In order to obtain these advantages, it is essential to arrange a pipe connecting the bottom of the reactor to a region of the reactor situated over the fluidized bed.

According to the present invention, the liquid flows upward in the external pipe **without requiring pumping devices.** In fact, the pressure gradient Δp existing between the zone underlying the distribution plate and the zone overlying the polymer fluidized bed causes freely the fluid to flow upwards along said pipe. In a manner unknown in the prior art embodiments said pressure gradient, which is made available by the recycle compressor, can be exploited to introduce the condensed liquid into the reactor without using additional pumps or similar devices. (Emphasis added)

As such, since the instant application remedies the deficiencies of Chinh, et al., Applicant respectfully traverses the current rejection. In particular, as outlined *supra* and in Applicant's specification, Chinh, et al. discloses in col. 7, lines 22-25; col. 9, lines 44-55; col. 10, lines 3-7; col. 10, line 55 - col. 11, line 3, respectively,

> Preferably, the liquid is continuously circulated **by means of a pump. Suitably, sufficient liquid is circulated to allow the pump to be operated in a continuous mode.**
>
> *****
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> The liquid may be introduced into the fluidised-bed by suitably arranged **injection means. A single injection means** may be used or **a plurality of injection means** may be arranged **within the fluidised bed.**
>
> A preferred arrangement is to provide **a plurality of injection means** substantially equally spaced **in the fluidised bed** in the region of the introduction of the liquid. The number of injection means used is that number which is required to provide sufficient penetrations and dispersion of liquid at each injection means to achieve good dispersion of liquid across the bed. **A preferred number of injection means is four.**
>
> *****
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> The **injection means** are preferably arranged such that they **protrude substantially vertically into the fluidised bed**, but may be arranged such that they **protrude** from the walls of the reactor in a **substantially horizontal direction.**
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> *****
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> The **injection means** are suitably nozzles which **protrude into the bed** through the reactor wall (or through a supporting grid for the bed) and which carry one or more jet outlets to deliver the liquid to the bed.

> It is important in the process to the present invention to achieve good dispersion and penetration of the liquid in the bed. (Emphasis added).

However, as outlined in Applicant's specification, Applicant's currently claimed process allows improved cooling of the upper region of the fluidized bed, without causing turbulence and interference with the fluidization conditions of the polymer bed while simultaneously cooling the lower region of the fluidized bed. Additionally, Applicant's currently claimed process does not necessarily require injection means directly protruding into the fluidized bed, as well as pumping devices as required in Chinh, et al. In fact, Applicant's specification outlines the deficiencies of using the process of Chinh, et al. (i.e., injection means in the bed can cause undesirable turbulence and fouling in the reactor in the vicinity of the injection apparatuses, while the process of Chinh, et al. requires using a pumping device; see page 5, line 25 - page 6, line 19 of Applicant's specification). As such, Applicant respectfully believes Applicant's currently claimed novel and patentably distinct process overcomes the deficiencies of Chinh, et al. as outlined in Applicant's specification.

This being said, now turning to the instant Office Action, Applicant respectfully believes not only does the current Office Action not address the issues highlighted above by Applicant, but as demonstrated above, Applicant respectfully believes Chinh, et al. clearly teaches away from Applicant's currently claimed process. A

prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, U.S. 851 (1984). See MPEP §2141.02 VI. For the reasons outlined *supra*, Applicant respectfully believes the Examiner has not established a *prima facie* case of obviousness, and the current rejection should be withdrawn. See MPEP §2142.

Notwithstanding the deficiencies outlined above, Applicant further respectfully traverses the Examiner's remarks on page 4, line 12 - page 5, line 2 of the current Office Action, which states,

> Thus, WO '986 teaches, as alternative embodiments, terminating the external pipe in the wall of the reaction chamber or the outlet section of the reactor (pp. 4-5, bridging paragraph), for the purpose of transporting condensed liquid to the upper portion of a fluidized bed reactor in order to enhance production rate.
>
> Since EP '204 is similarly concerned with achieving higher levels of productivity via enhanced cooling effect (cf., e.g., paragraph 0053), it would have been obvious to an ordinary skilled practioner at the time of applicants' invention to modify the process disclosed therein by feeding the condensed, separated liquid through an external pipe(s) as per WO '986 to a position above the upper limit of the fluidized bed, as claimed. The expectation of thereby providing an alternative continuous polymerization process with comparable improvements in production rate would have provided the requisite motivation to those of ordinary skill in the art to modify the primary reference so as to produce the instantly claimed invention.

However, WO 02/41986 (herein referred to as "Mutsers, et al."), discloses the external connecting pipe used in the process is

placed above the distribution grid. See Fig. 1 of Mutsers, et al. In fact, the external connecting pipe of Mutsers, et al. is a polymerization zone filled with the polymer bed, which is collaborated by the disclosure of Mutsers, et al., which states on page 4, lines 10-12, and page 4, line 36 - page 5, line 3,

> Hence, **a product** may be formed **in the connecting pipes** that has for example a different molecular weight or molecular weight distribution or, particularly in the manufacture of copolymers, a different chain structure.
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> *****
>
> A connecting pipe preferably terminates in the wall of the reaction chamber or of the outlet section and is preferably connected thereto **at such angle that polymer build-up on the lower side of the wall of the connecting sections of the connecting pipe is prevented as much as possible**. (Emphasis added).

In other words, not only is the external pipe of Mutsers, et al. used as a polymerization zone to produce a product with different properties than the product produced in the main fluidized bed, but in order to prevent fouling, Mutsers, et al. clearly discloses the inlet of the connecting pipe must be angled in such a way to prevent polymer build-up on the lower side of the reactor wall. In fact, the only reason the connecting pipe of Mutsers, et al. must be angled in a certain way is due to the fact that the connecting pipe is a reaction zone filled with a polymer bed. Alternatively, in Applicant's currently claimed process, a two-phase mixture enriched in liquid runs through the external pipe, with the external pipe comprising an inlet below the distribution plate, and

the two-phase mixture then being reintroduced above the fluidized bed in the reactor. As outlined in Applicant's specification, this process has many advantages. In particular, as outlined in Applicant's specification on page 8, lines 12-19,

> Many advantages can be accomplished by carrying out the process of the invention. In the first place, **the introduction of condensed liquid above the fluidized bed improves the cooling of the upper region of the fluidized bed without causing any turbulence and interference with the fluidization conditions of the polymer bed. Simultaneously, the remaining part of condensed liquid moves upwards through the distribution plate so as to effect a good cooling of the lower region of the bed.** In order to obtain these advantages, it is essential to arrange a pipe connecting the bottom of the reactor to a region of the reactor situated over the fluidized bed. (Emphasis added)

However, as with Chinh, et al., the current Office Action fails to address this deficiency in Mutsers, et al. Yet, this is the Examiner's initial burden to establish a *prima facie* case of obviousness. See MPEP §2142. As such, Applicant respectfully believes the current rejection should be withdrawn.

Additionally, Applicant respectfully believes one of ordinary skill in the art would not have modified Chinh, et al. and Mutsers, et al. as purported by the Examiner, since the proposed modifications to both documents would change the principle operation of both separate processes disclosed in Chinh, et al. and Mutsers, et al., and, at the very least, would render Mutsers, et al. unsatisfactory for its intended purpose. In particular, Chinh, et al. discloses the use of injection means (i.e., nozzles) in the

fluidization bed, as well as a pump to circulate the recycle stream, are both critical aspects of the reactor to carry out the process, whereas as outlined *supra*, Applicant's currently claimed process overcomes the deficiencies of these critical aspects of the process of Chinh, et al. With respect to Mutsers, et al., as outlined *supra*, the external pipe of the reactor for the process disclosed in Mutsers, et al. is used as a polymerization zone to produce a product, ostensibly different than the product produced in the main fluidization bed, whereas in Applicant's currently claimed process, the external pipe is used to transport a two-phase mixture above the fluidization bed to cool the upper part of the bed, without causing turbulence and interference with the fluidization conditions of the fluidization bed. See *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984), and *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959). Also see MPEP §2143.01 V and VI.

As for U.S. Patent 6,306,981 (herein referred to as "Brown, et al."), Applicant respectfully believes Brown, et al. does not remedy the deficiencies of Chinh, et al. and Mutsers, et al. outlined *supra*.

In light of the above, claims 29-61 are believed to be novel and patentably distinct over Chinh, et al. in view of Mutsers, et al. and/or Brown, et al. Accordingly, Applicant respectfully believes the current rejection should be withdrawn.

CONCLUSION

Based upon the above remarks, the presently claimed subject matter is believed to be novel and patentably distinguishable over the prior art of record. The Examiner is therefore respectfully requested to reconsider and withdraw the objection and rejection, and allow all pending claims 29-61. Favorable action with an early allowance of the claims pending in this application is earnestly solicited.

The Examiner is welcomed to telephone the undersigned practioner if any questions or comments arise.

Respectfully submitted,

By: _____
Jarrod N. Raphael
Registration No. 55,566
Customer No. 34872

Date: June _____, 2008
Basell USA Inc.
Delaware Corporate Center II
2 Righter Parkway, Suite 300
Wilmington, Delaware 19803
Telephone No.: 302-683-8176
Fax No.: 302-731-6408

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